INDIANA
NON-NATIVE PLANT INVASIVENESS RANKING FORM

ASSESSMENT FOR INVASIVE PLANTS NOT IN TRADE
Form originally created for use in New York
Indiana Form version date: November 1, 2010

[k]

Scientific name:	Dipsacus laciniatus L. USDA Plants Code: DILA4
Common names:	Cut-Leaf Teasel
Native distribution:	Temperate Eurasia
Date assessed:	April 6, 2011
Assessors:	Pia Marie Paulone and Ellen Jacquart
Reviewers:	John Drake and Ted Anchor
Date Approved:	September 21, 2012

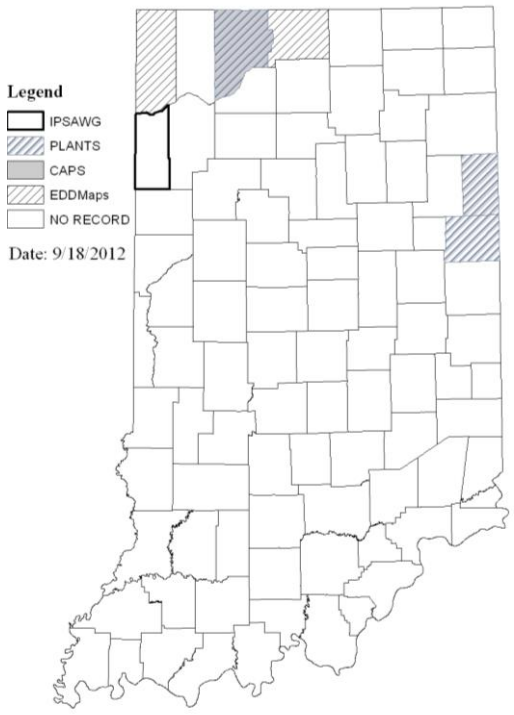
Indiana Invasiveness Rank: High (Relative Maximum Score 70.00-80.00)

Invasiveness Ranking Summary (see details under appropriate sub-section)		Total (Total Answered*) Possible	Total
1	Ecological impact	40 (30)	20
2	Biological characteristic and dispersal ability	25 (25)	19
3	Ecological amplitude and distribution	25 (25)	22
4	Difficulty of control	10 (10)	7
	Outcome score	100 (90)[b]	68[a]
	Relative maximum score †		75.55
	Indiana Invasiveness Rank §	High (Relative Maximum Score 70.00-80.00)	

* For questions answered "unknown" do not include point value in "Total Answered Points Possible." If "Total Answered Points Possible" is less than 70.00 points, then the overall invasive rank should be listed as "Unknown."
†Calculated as 100(a/b) to two decimal places.
§Very High >80.00; High 70.00−80.00; Moderate 50.00−69.99; Low 40.00−49.99; Insignificant <40.00

A. DISTRIBUTION (KNOWN/POTENTIAL):

A1 Has this species been documented to persist without cultivation in IN? (reliable source; voucher not required)	
☒	**Yes – continue to A2.2**
☐	No – continue to A2.1
A2What is the likelihood that this species will occur and persist outside of cultivation given the climate in Indiana? (obtain from occurrence data in other states with similar climates)	
☐	Likely – continue to A3
☐	Not likely – stop here. There is no need to assess the species



Documentation:
Sources of information: Range maps compiled from PLANTS database, http://plants.usda.gov/java/; Indiana CAPS database, http://extension.entm.purdue.edu/CAPS/index.html; Indiana IPSAWG reports (unpublished); and EDDMapS reports, http://eddmaps.org/

A3 Describe the potential or known suitable habitats within Indiana (underlined). Natural habitats include all habitats not under active human management. Managed habitats are indicated with an asterisk.

Aquatic Habitats	**Wetland Habitats**	**Upland Habitats**
Rivers/streams	Marshes	**Forest**
Natural lakes and ponds	Fens	**Savannas**
Reservoirs/impoundments*	Bogs	**Barrens**
	Shrub swamps	**Prairies**
	Forested wetlands/riparian	Cultivated*
	Beaches/dunes	**Old Fields***
	Ditches*	**Roadsides***

Other potential or known suitable habitats within Indiana:
No additional habitats.

Documentation:
Sources of information:
Brooklyn Botanic Garden, 2009, Jacquart and Anchor personal observation.

B. INVASIVENESS RANKING
Questions apply to areas similar in climate and habitats to Indiana unless specified otherwise.

1. ECOLOGICAL IMPACT

1.1. Impact on Natural Ecosystem Processes and System-Wide Parameters (e.g. fire regime, geomorphological changes (erosion, sedimentation rates), hydrologic regime, nutrient and mineral dynamics, light availability, salinity, pH)

A.	No perceivable impact on ecosystem processes based on research studies, or the absence of impact information if a species is widespread (>10 occurrences in minimally managed areas), has been well-studied (>10 reports/publications), and has been present in the northeast for >100 years.	0
B.	Influences ecosystem processes to a minor degree (e.g., has a perceivable but mild influence on soil nutrient availability)	3
C.	Significant alteration of ecosystem processes (e.g., increases sedimentation rates along streams or coastlines, reduces open water that are important to waterfowl)	7
D.	Major, possibly irreversible, alteration or disruption of ecosystem processes (e.g., the species alters geomorphology and/or hydrology, affects fire frequency, alters soil pH, or fixes substantial levels of nitrogen in the soil making soil unlikely to support certain native plants or more likely to favor non-native species)	10
U.	Unknown	

Score U

Documentation:
Identify ecosystem processes impacted (or if applicable, justify choosing answer A in the absence of impact information)
While the plant has been known in the U.S. since the 1800s, specific studies on its impacts to ecosystem processes and system wide parameters are not known
Sources of information:
Grauver, 2006;

1.2. Impact on Natural Community Structure

A.	No perceived impact; establishes in an existing layer without influencing its structure	0
B.	Influences structure in one layer (e.g., changes the density of one layer)	3
C.	Significant impact in at least one layer (e.g., creation of a new layer or elimination of an existing layer)	7
D.	Major alteration of structure (e.g., covers canopy, eradicating most or all layers below)	10
U.	Unknown	

Score 7

Documentation:
Identify type of impact or alteration:
Large stands can significantly increase the density of the herb layer, and also significantly increasing the height of the herb layer, D. laciniatus obtaining heights up to 3 m. Snyder & Kaufman (2004): "teasels significantly alter the structure of rare natural plant communities."
Sources of information:
Snyder & Kaufmann, 2004; Gravuer, 2006

1.3. Impact on Natural Community Composition

A.	No perceived impact; causes no apparent change in native populations	0
B.	Influences community composition (e.g., reduces the number of individuals in one or more native species in the community)	3
C.	Significantly alters community composition (e.g., produces a significant reduction in the population size of one or more native species in the community)	7
D.	Causes major alteration in community composition (e.g., results in the extirpation of one or several native species, reducing biodiversity or change the community composition towards species exotic to the natural community)	10
U.	Unknown	

Score 10

Documentation:
Identify type of impact or alteration:
Smaller stands simply reduce the number of native individuals for a species in an area, whereas larger, dense stands can significantly reduce numbers of plant species. Also, in New Jersey, the species has been reported to have invaded limestone fens and caused the reduction or extirpation of several rare plant species, including the globally rare globe flower (Trollius laxus subsp. laxus).
Sources of information:
Snyder & Kaufman, 2004

1.4. Impact on other species or species groups (cumulative impact of this species on the animals, fungi, microbes, and other organisms in the community it invades. Examples include reduction in nesting/foraging sites; reduction in habitat connectivity; injurious components such as spines, thorns, burrs, toxins; suppresses soil/sediment microflora; interferes with native pollinators and/or pollination of a native species; hybridizes with a native species; hosts a non-native disease which impacts a native species)

A.	Negligible perceived impact	0
B.	Minor impact	3
C.	Moderate impact	7
D.	Severe impact on other species or species groups	10
U.	Unknown	

Score 3

Documentation:
Identify type of impact or alteration:
Plant is quite prickly; other impacts to other species or species groups not known.
Sources of information:
Jacquart pers. obs.

Total Possible	30
Section One Total	20

2. BIOLOGICAL CHARACTERISTICS AND DISPERSAL ABILITY

2.1. Mode and rate of reproduction

A.	No reproduction by seeds or vegetative propagules (i.e. plant sterile with no sexual or asexual reproduction).	0
B.	Limited reproduction (fewer than 10 viable seeds per plant AND no vegetative reproduction; if viability is not known, then maximum seed production is less than 100 seeds per plant and no vegetative reproduction)	1
C.	Moderate reproduction (fewer than 100 viable seeds per plant - if viability is not known, then maximum seed production is less than 1000 seeds per plant - OR limited successful vegetative spread documented)	2
D.	Abundant reproduction with vegetative asexual spread documented as one of the plants prime reproductive means OR more than 100 viable seeds per plant (if viability is not known, then maximum seed production reported to be greater than 1000 seeds per plant.)	4
U.	Unknown	

Score 4

Documentation:
Describe key reproductive characteristics (including seeds per plant):
Large plants can produce over 2,000 seeds; viability is high -- often 80% or more.
Sources of information:
Grauver, 2006;

2.2. Innate potential for long-distance dispersal (e.g. bird dispersal, sticks to animal hair, buoyant fruits, pappus for wind-dispersal)

A.	Does not occur (no long-distance dispersal mechanisms)	0
B.	Infrequent or inefficient long-distance dispersal (occurs occasionally despite lack of adaptations)	1
C.	Moderate opportunities for long-distance dispersal (adaptations exist for long-distance dispersal, but studies report that 95% of seeds land within 100 meters of the parent plant)	2
D.	Numerous opportunities for long-distance dispersal (adaptations exist for long-distance dispersal and evidence that many seeds disperse greater than 100 meters from the parent plant)	4
U.	Unknown	

Score 1

Documentation:
Identify dispersal mechanisms:
Most seeds fall near the parent plant. Occasional long distance dispersal by water and wind -- possibly assisted by highways that create wind corridors -- may occur despite specific adaptations.
Sources of information:
Glass, 1990; Smith, 2004; Grauver, 2006; Rector et al., 2006; author's pers. obs.

2.3. Potential to be spread by human activities (both directly and indirectly – possible mechanisms include: commercial sales, use as forage/revegetation, spread along

highways, transport on boats, contaminated compost, land and vegetation management equipment such as mowers and excavators, etc.)

A.	Does not occur	0
B.	Low (human dispersal to new areas occurs almost exclusively by direct means and is infrequent or inefficient)	1
C.	Moderate (human dispersal to new areas occurs by direct and indirect means to a moderate extent)	2
D.	High (opportunities for human dispersal to new areas by direct and indirect means are numerous, frequent, and successful)	3
U.	Unknown	

Score 3

Documentation:
Identify dispersal mechanisms:
Readily dispersed by mowing equipment; also occasionally sold for cultivation and in dried flower displays.
Sources of information:
Gremaud & Smith, 2002; Snyder & Kaufman, 2004; Grauver, 2006; author's pers. obs.

2.4. Characteristics that increase competitive advantage, such as shade tolerance, ability to grow on infertile soils, perennial habit, fast growth, nitrogen fixation, allelopathy, etc.

A.	Possesses no characteristics that increase competitive advantage	0
B.	Possesses one characteristic that increases competitive advantage	3
C.	Possesses two or more characteristics that increase competitive advantage	6
U.	Unknown	

Score 3

Documentation:
Evidence of competitive ability:
Perennial or biennial monocarp (i.e., dies after setting seed); no other characteristics known that increase competitive advantage.
Sources of information:
Grauver, 2006.

2.5. Growth vigor

A.	Does not form thickets or have a climbing or smothering growth habit	0
B.	Has climbing or smothering growth habit, forms a dense layer above shorter vegetation, forms dense thickets, or forms a dense floating mat in aquatic systems where it smothers other vegetation or organisms	2
U.	Unknown	

Score 2

Documentation:
Describe growth form:
Forms a very dense tall thickety layer above shorter vegetation.
Sources of information:
Snyder & Kaufman, 2004; Grauver, 2006; author's pers. obs.

2.6. Germination/Regeneration

A.	Requires open soil or water and disturbance for seed germination, or regeneration from vegetative propagules.	0
B.	Can germinate/regenerate in vegetated areas but in a narrow range or in special conditions	2
C.	Can germinate/regenerate in existing vegetation in a wide range of conditions	3

U. Unknown (No studies have been completed)

Score 3

Documentation:
Describe germination requirements:
Germinates in existing vegetation, including fescue turfs, in a wide range of conditions, usually in richer, limestone soils.
Sources of information:
Grauver, 2006; author's pers. obs.

2.7. Other species in the genus invasive in Indiana or elsewhere

A. No 0
B. Yes 3
U. Unknown

Score 3

Documentation:
Species:
Dipsacus fullonum considered invasive in Indiana and elsewhere in northeast U.S. U.S.D.A. NRCS, 2012.

Total Possible 25
Section Two Total 19

3. ECOLOGICAL AMPLITUDE AND DISTRIBUTION

3.1. Density of stands in natural areas in the northeastern USA and eastern Canada (use same definition as Gleason & Cronquist which is: "The part of the United States covered extends from the Atlantic Ocean west to the western boundaries of Minnesota, Iowa, northern Missouri, and southern Illinois, south to the southern boundaries of Virginia, Kentucky, and Illinois, and south to the Missouri River in Missouri. In Canada the area covered includes Nova Scotia, Prince Edward Island, New Brunswick, and parts of Quebec and Ontario lying south of the 47th parallel of latitude")

A. No large stands (no areas greater than 1/4 acre or 1000 square meters) 0
B. Large dense stands present in areas with numerous invasive species already present or disturbed landscapes 2
C. Large dense stands present in areas with few other invasive species present (i.e. ability to invade relatively pristine natural areas) 4
U. Unknown

Score 4

Documentation:
Identify reason for selection, or evidence of weedy history:
Large stands can occur over 0.25 acres sometimes in areas lacking other invasives.
Sources of information:
Snyder & Kaufman, 2004; Gravuer, 2006

3.2. Number of habitats the species may invade

A. Not known to invade any natural habitats given at A2.2 0
B. Known to occur in two or more of the habitats given at A2.2, with at least one a natural habitat. 1

C. Known to occur in three or more of the habitats given at A2.2, with at least two a natural habitat. 2
D. Known to occur in four or more of the habitats given at A2.2, with at least three a natural habitat. 4
E. Known to occur in more than four of the habitats given at A2.2, with at least four a natural habitat. 6
U. Unknown

Score 6

Documentation:
Identify type of habitats where it occurs and degree/type of impacts:
See A2.2.
Sources of information:
Snyder & Kaufman, 2004; Grauver, 2006; Brooklyn Botanic Garden, 2009

3.3. Role of disturbance in establishment

A. Requires anthropogenic disturbances to establish. 0
B. May occasionally establish in undisturbed areas but can readily establish in areas with natural or anthropogenic disturbances. 2
C. Can establish independent of any known natural or anthropogenic disturbances. 4
U. Unknown

Score 4

Documentation:
Identify type of disturbance:
Usually found in disturbed areas, but also reported from undisturbed areas such as prairies.
Sources of information:
Snyder & Kaufman, 2005; Grauver, 2006; author's observation

3.4. Climate in native range

A. Native range does not include climates similar to Indiana 0
B. Native range possibly includes climates similar to at least part of Indiana 1
C. Native range includes climates similar to those in Indiana 3
U. Unknown

Score 3

Documentation:
Describe what part of the native range is similar in climate to Indiana:
Temperate Europe and Asia.
Sources of information:
Grauver, 2006; Brooklyn Botanic Garden, 2009.

3.5. Current introduced distribution in the northeastern USA and eastern Canada (see question 3.1 for definition of geographic scope)

A. Not known from the northeastern US and adjacent Canada 0
B. Present as a non-native in one northeastern USA state and/or eastern Canadian province. 1
C. Present as a non-native in 2 or 3 northeastern USA states and/or eastern Canadian provinces. 2
D. Present as a non-native in 4–8 northeastern USA states and/or eastern Canadian provinces, and/or categorized as a problem weed (e.g., "Noxious" or "Invasive") in 1 northeastern state or eastern Canadian province. 3
E. Present as a non-native in >8 northeastern USA states and/or eastern Canadian provinces. and/or categorized as a problem weed (e.g., "Noxious" or "Invasive") in 2 northeastern states or eastern Canadian provinces. 4
U. Unknown

Score 4

Documentation:
Identify states and provinces invaded:
KY, IN, IL, IA, MA, MD, MI, MN, MO, NJ, NY, OH, PA, VA, WI, WV; Ont.
Sources of information:
See known introduced range in plants.usda.gov, and update with information from states and Canadian provinces.
U.S.D.A. NRCS, 2009.

3.6. Current distribution of the species outside of cultivation in Indiana

A.	Present in no Indiana counties	0
B.	Present in 1-10 Indiana counties	1
C.	Present in 11-20 Indiana counties	2
D.	Present in 21-50 Indiana counties	3
E.	Present in more than 50 Indiana counties or on Federal noxious weed list	4
U.	Unknown	

Score 1

Documentation:
Describe distribution:
See A1.1.
Sources of information:

Total Possible 25
Section Three Total 22

4. DIFFICULTY OF CONTROL

4.1. Seed banks

A.	Seeds (or vegetative propagules) remain viable in soil for less than 1 year, or does not make viable seeds or persistent propagules.	0
B.	Seeds (or vegetative propagules) remain viable in soil for at least 1 to 10 years	2
C.	Seeds (or vegetative propagules) remain viable in soil for more than 10 years	3
U.	Unknown	

Score 2

Documentation:
Identify longevity of seed bank:
Seeds reported to remain viable in soil for up to two years; no evidence for 10 years.
Sources of information:
Glass, 1990; Smith, 2004.

4.2. Vegetative regeneration

A.	No regrowth following removal of aboveground growth	0
B.	Regrowth from ground-level meristems	1
C.	Regrowth from extensive underground system	2
D.	Any plant part is a viable propagule	3
U.	Unknown	

Score 1

Documentation:
Describe vegetative response:
Regrowth from basal rosettes.
Sources of information:
Grauver, 2006; Jacquart pers. obs.

4.3. Level of effort required

A. Management is not required: e.g., species does not persist without repeated anthropogenic disturbance. 0

B. Management is relatively easy and inexpensive: e.g. 10 or fewer person-hours of manual effort (pulling, cutting and/or digging) can eradicate a 1 acre infestation in 1 year (infestation averages 50% cover or 1 plant/100 ft^2). 2

C. Management requires a major short-term investment: e.g. 100 or fewer person-hours/year of manual effort, or up to 10 person-hours/year using mechanical equipment (chain saws, mowers, etc.) for 2-5 years to suppress a 1 acre infestation. Eradication is difficult, but possible (infestation as above). 3

D. Management requires a major investment: e.g. more than 100 person-hours/year of manual effort, or more than 10 person hours/year using mechanical equipment, or the use of herbicide, grazing animals, fire, etc. for more than 5 years to suppress a 1 acre infestation. Eradication may be impossible (infestation as above). 4

U. Unknown

Score 4

Documentation:
Identify types of control methods and time-term required:
The following is from Gruver (2006): "The Invasive Plant Association of Wisconsin (IPAW) regards this species as relatively difficult to control (IPAW 2003). Mechanical control is recommended in natural areas. In small stands, rosettes can be dug up, although plants often resprout if the root is not completely removed and damage to the surrounding area can occur if plants are large. Stalks can also be cut once flowering has begun, but before seed set. Because seeds can develop on immature heads, however, the cut stalks need to be removed from the area. Also, cutting of flowering stems may need to be repeated for several years to achieve effective control. Mowing is not an effective control, and in fact often increases the size of patches (Parrish et al. 2005). If mechanical control is not feasible, foliar application of herbicides can be used. Because rosettes of this species are green in early spring and late fall when many native plants are dormant, herbicide control during these times will minimize damage to native species. Also, dicot-selective herbicides (e.g. Triclopyr) are effective, which reduces damage to native monocots. As with mechanical control, however, herbicide applications over several years are required to manage an established population. Periodic prescribed burning may be helpful in conjunction with mechanical and/or chemical control (Glass 1990, Weber 2003, Smith 2004, WIDNR 2004, Czarapata 2005). No biocontrol agents are currently in use, but these are being researched (Rector et al. 2006).
"Several years (up to 5-6) of treatment may be necessary to totally eradicate this species from a natural community, regardless of whether mechanical or chemical treatment is chosen (Glass 1990, Gremaud and Smith 2002, Smith 2004, WIDNR 2004, Czarapata 2005).
"If rosettes are dug up, damage to the surrounding area can occur if plants are large. If flowering stems are cut, native species of similar height may also be cut in the process. If herbicides are used, non-target damage may occur, though this can be minimized by spraying during the dormant season and/or using a dicot-specific herbicide (Glass 1990, Weber 2003, Smith 2004, WIDNR 2004, Czarapata 2005)."
Sources of information:

Childs, 2003; Fellows, 2004.

Total Possible	10
Section Four Total	7
Total for 4 sections Possible	100
Total for 4 sections	68

References for species assessment:

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Rice, P.M. 2006. Invaders Database System. Division of Biological Sciences, University of Montana, Missoula. <invader.dbs.umt.edu>. [Accessed October 22, 2009.]

Rydberg, Per Axel. 1932. Flora of the Prairies and Plains of Central North America. The New York Botanical Garden, New York, New York. 969 p.

Scoggan, H.J. 1978-1979. The flora of Canada: Parts 1-4. National Museums Canada, Ottawa. 1711 pp.

Seymour, F.C. 1989. The flora of New England. A manual for the identification of all vascular plants including ferns and their allies growing without cultivation in New England. Boston Museum Science, Boston. 611 pp.

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Citation: This IN ranking form may be cited as: Jacquart, E.M. 2012. Invasiveness ranking system for non-native plants of Indiana. Unpublished. Invasive Plant Advisory Committee (IPAC) to the Indiana Invasive Species Council, Indianapolis, IN.

Acknowledgments: The IN ranking form is an adaptation for Indiana use of the form created for New York by Jordan et al. (2009), cited below. Documentation for species assessed for New York are used for Indiana where they are applicable. The Invasive Plant Advisory Committee was created by the Indiana Invasive Species Council in October 2010, and is made up of the original members of the Indiana Invasive Plant Assessment Working Group (IPSAWG). Original members of IPSAWG included representatives of the The Nature Conservancy; Indiana Native Plant and Wildflower Society; Indiana Nursery and Landscape Association; Indiana Chapter of the American Society of Landscape Architects; Indiana Forage Council; Indiana Wildlife Federation; Indiana State Beekeepers Association; Indiana Beekeeper's Association; Department of Natural Resources; Hoosier National Forest; Indiana Academy of Science; Natural Resources Conservation Service; Indiana Department of Environmental Management; Indiana Department of Transportation; Purdue Cooperative Extension Service; Seed Administrator, Office of the Indiana State Chemist.

References for the Indiana ranking form:

Jordan, M.J., G. Moore, and T.W. Weldy. 2009. Invasiveness ranking system for non-native plants of New York. Unpublished. The Nature Conservancy, Cold Spring Harbor, NY; Brooklyn Botanic Garden, Brooklyn, NY; The Nature Conservancy, Albany, NY.

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